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July 5, 1958

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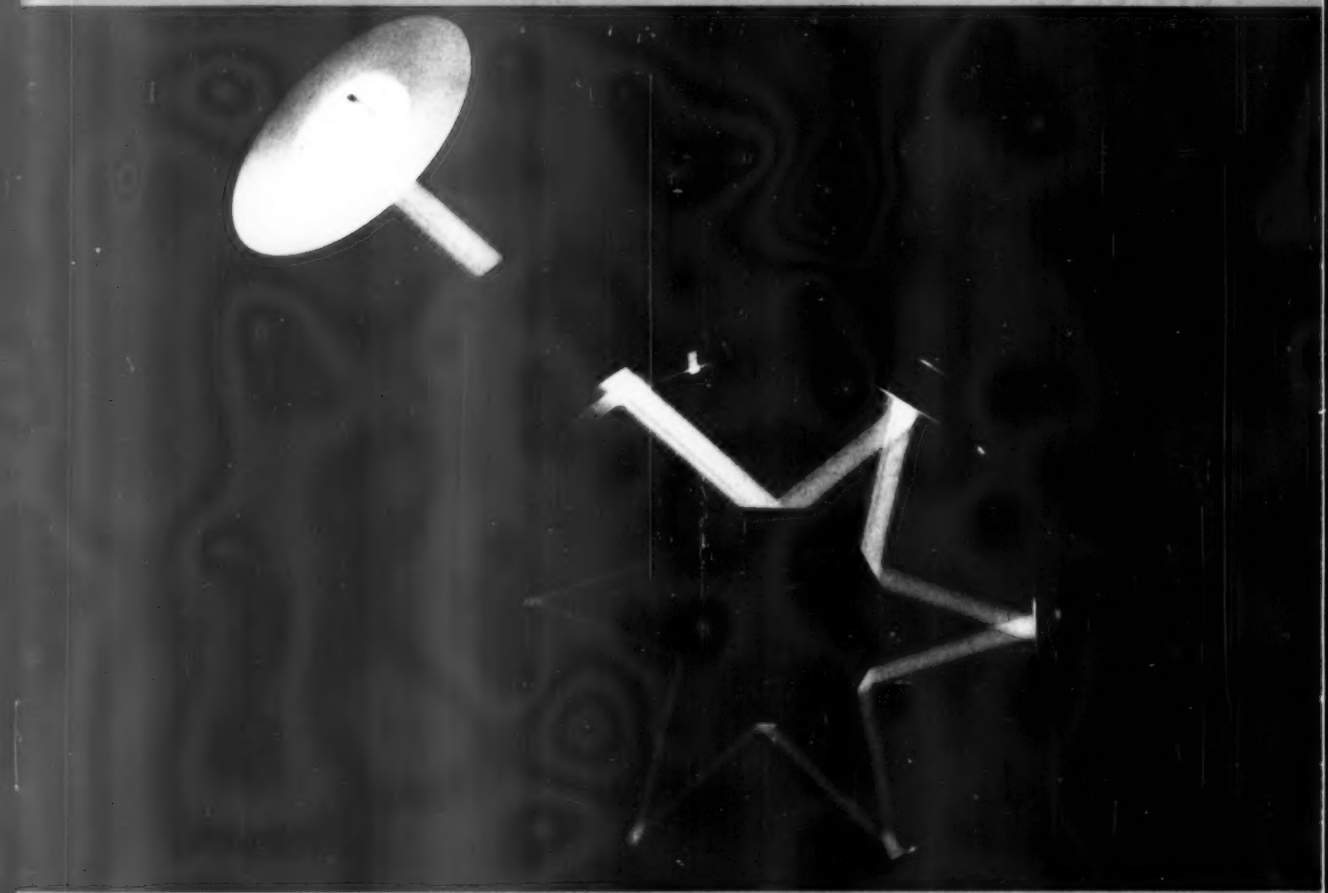
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

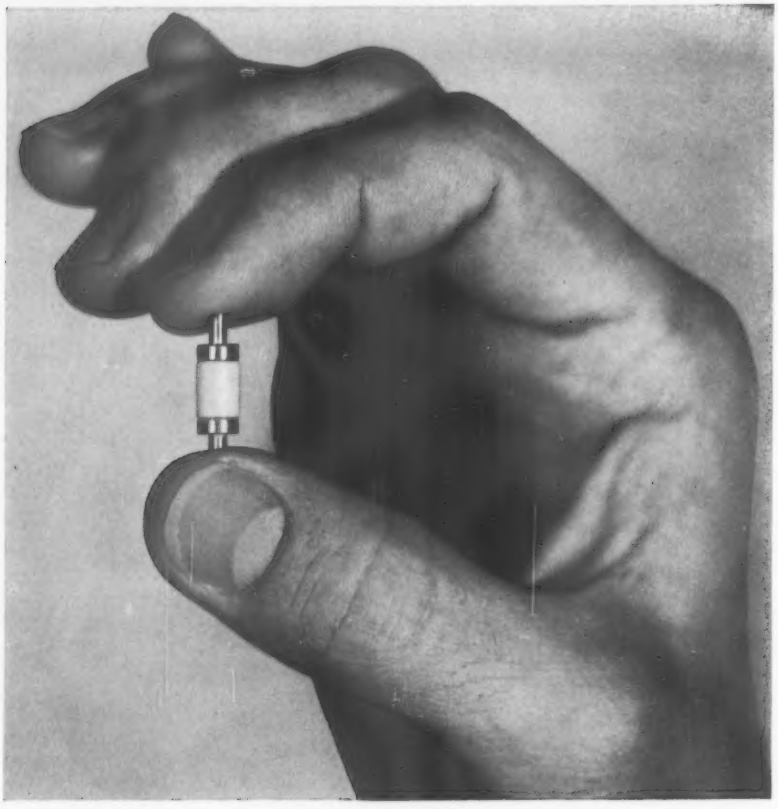


Sliced Light

See Page 6

A SCIENCE SERVICE PUBLICATION

NEW DIODE SPEEDS VOICES—



AT 6,000,000,000 C. P. S.

How the radio art can be improved through solid state science is illustrated by a recent development at Bell Telephone Laboratories. To make voice signals travel by microwaves they must first be "converted"—caused to vibrate at billions of cycles per second. To date, it has been possible to accomplish this conversion only at the cost of appreciable loss of signal energy. Could a more efficient converter be provided?

In the field of solid state science it was known—as a laboratory curiosity—that semiconductor diodes can be made not only to convert the frequency of signals, but also to amplify them. At Bell Laboratories Dr. Arthur Uhlir, Jr., and his associates calculated that this amplifying action could be put to practical use. They proved the point by developing a junction diode converter which can deliver up to 40 times as much signal energy as previous converters.

This efficient new converter will be applied in a new Bell System microwave highway able to transmit thousands of telephone conversations and a dozen television programs simultaneously at six billion cycles per second. In other forms it is being developed, under Signal Corps contract, for radar and military communications where more efficient frequency conversion can also be used to advantage.

This development is an example of the many different ways in which Bell Laboratories works to improve your telephone service and communications at large.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

MEDICINE

Study Drug Reactions

Administering drugs, particularly antibiotics, steroids and tranquilizers, to patients can result in certain skin, psychological and systemic reactions that need more study.

➤ THE USE OF antibiotics, steroids and tranquilizers, in addition to helping many people, has also caused some skin, psychological and systemic reactions.

Skin eruption is one of the commonest reactions encountered during drug administration, Dr. Harold O. Perry of the Mayo Clinic told physicians attending the American Medical Association meeting in San Francisco.

In finding the cause of a skin reaction it may be more advisable to rely upon the past history of the drug's reaction on the patient, Dr. Perry said. The standard skin test for hypersensitivity to a drug may not reveal the trouble, he added. To duplicate the experience by introducing the suspected drug again is dangerous. In a case of this type, Dr. Perry suggested that the doctor "be satisfied with the partial proof" the historical evidence provides.

Steroids can cause salt retention and potassium depletion (both of which can result in gastrointestinal upset), undesirable central nervous system effects and tissue breakdown. These problems often become realities for patients who are given steroid drugs in large doses or for long periods, Dr. Laurence H. Kyle of Georgetown University School of Medicine, Washington, D. C. said. The sex hormones and bile acids belong to the steroid group.

The most "worrisome" problem is that the adrenal glands will cease to function normally during drug administration. Then if a severe illness occurs, there will be insufficient adrenal hormone available to help the patient survive. Dr. Kyle recommended, on these grounds, that information regarding the use of steroids become an integral part of every patient's record.

Among the complications produced by tranquilizers are adverse behavioral effects, toxic effects on the central and autonomic nervous system, allergic reactions, and metabolic or endocrine effects, Dr. Leo E. Hollister, Veterans Administration Hospital, Palo Alto, Calif., said. However, their benefits in carefully selected patients outweigh the dangers, he added.

Lung Cancer Detection

➤ A NEW LUNG CANCER detecting technique is so simple that it can be made a routine part of a general physical examination.

The technique consists of an aerosol unit that was also designed for medicinal inhalation at home for the relief of bronchial asthma and emphysema, both respiratory diseases.

Special feature of the aerosol unit, called a Nebu-halent, is a built-in heater thermostat that warms a salt spray solution to a maintained temperature of 125 degrees Fahrenheit.

The heated solution is sprayed with the "touch-action" unit into the bronchi, causing the patient to cough up secretions that can be examined for cancer cells.

The unit was developed by Drs. Alvan L. Barach, Gustav J. Beck and H. A. Bickerman of Columbia-Presbyterian Medical Center, New York. Dr. Beck described it to scientists at the Medical Association meeting.

The technique is effective in detecting lung cancer when diagnosis is not suspected or is in doubt due to "inadequate X-ray evidence or the patient's inability to raise sputum spontaneously," Dr. Beck explained.

The New York physicians have examined about 250 persons, including normal volunteers and carcinoma suspects. Of these, 40 have been diagnosed as having cancer, with later confirmation of diagnosis by other means.

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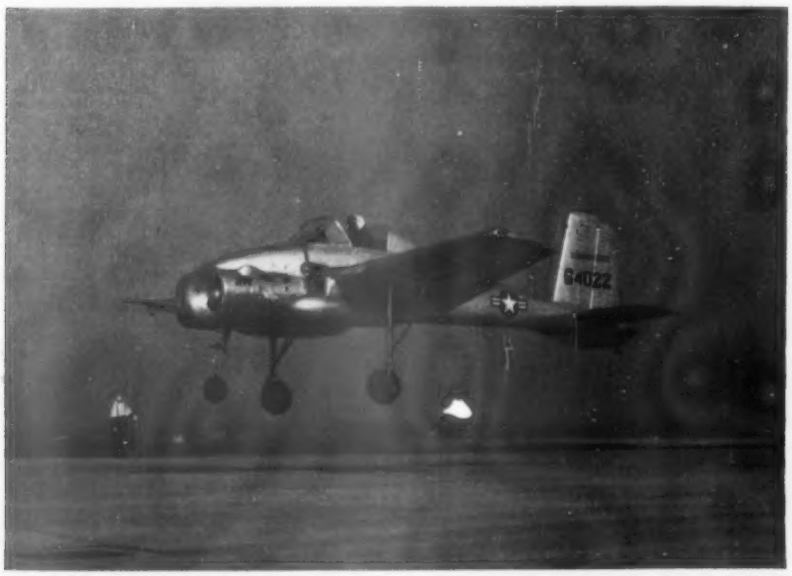

VERTICAL RISING JET—For the first time in aviation history a jet-powered airplane, the experimental Bell X-14, has risen straight up from a runway in the conventional horizontal pattern and returned to the starting point to hover and land vertically. Two jet engines provide more than 3,500 pounds of thrust to lift the airplane vertically and propel it forward. Jet thrust is deflected downward for take-off by venetian-blind type vanes installed behind the engine. Compressed air nozzles at wing tips and tail provide directional control.

MEDICINE

Radioactive Gas Spots Holes in Hearts

➤ RADIOACTIVE gas, iodine isotope 131, breathed by patients can tell whether there are holes in the heart wall between right and left chambers. Blood samples are taken from arteries and veins every five seconds in the method developed by Drs. Robert Case, Paul Keating and H. L. Sachs, St. Luke's Hospital, New York, and reported to the New York Heart Association.

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CHEMISTRY

Antidote Perfected For Lethal Gas

➤ A PROTECTING ANTIDOTE for the nerve gas called sarin has been developed.

While it has not been tested on humans, the antidote has successfully blocked the lethal action of sarin in mice, a biochemist reported at the medicinal chemistry symposium of the American Chemical Society meeting in Madison, Wis.

The antidote consists of a combination of PAD, pyridine-2-aldoxime dodeciodide, and the closely related PAM, pyridine-2-aldoxime methiodide, Dr. Irwin B. Wilson of Columbia University's College of Physicians and Surgeons said.

Nerve gases are lethal because they either paralyze the muscles that control breathing, or they attack the central nervous system.

Administration of PAD and PAM to mice, before exposure to the gas, resulted in complete survival, while the use of either compound alone yielded almost no survivors, Dr. Wilson reported.

If the new combination successfully blocks the lethal effects of the gas in humans, it will greatly inhibit the use of sarin as a weapon.

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CONSERVATION

Conservation Help Asked

➤ A YEAR-ROUND army of conservation workers has been proposed to attack two national problems: juvenile delinquency and conservation of national resources.

A Youth Conservation Corps could be the answer.

Some conservationists believe such a group of young men could help curb juvenile delinquency by giving teen-agers some constructive work to do. At the same time, manpower would be made available for conservation work.

The nation needs workers to take care of its parks and national forests. Millions use these public recreational lands each year and there is an urgent need to expand and improve the facilities.

Legislation currently before Congress has a good chance of solving both problems. Sen. Hubert Humphrey (D.-Minn.) has proposed a 150,000-man Youth Conservation Corps made up of 17- to 23-year olds. These young men, given proper guidance and training, could do the nation a great service. They would also be earning good salaries and learning important lessons in caring for national resources. Tentatively the bill (S-3582) calls for the young men to sign up for one year, although shorter periods of time would probably be possible.

The Youth Conservation Corps, or whatever other name would be given to the group, would be designed to operate under the Department of Health, Education and Welfare.

Plans are being pushed to get a hearing for the bill before the Labor and Public Welfare Committee, Sen. Humphrey's office told SCIENCE SERVICE. So far, all comments concerning the proposed legislation are very favorable and there is a chance at least some action will be taken this session of Congress.

In contrast to the Civilian Conservation Corps of the early 1930's, proponents of the bill point out, there must be no recession or "make work" stigma associated with the new proposal.

The young men are needed for the service they can do their country. Conservation is a big, and growing, problem and working to solve it does not mean accepting a "dole."

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ENGINEERING

Soviet May Outproduce Us

➤ BY 1970, Russian factories may be better than ours unless there is a change in United States thinking.

Nevin L. Bean of the Ford Motor Company, Livonia, Mich., a member of a U. S. team that visited the Soviet Union to see what the Russians are doing in automation and other technical developments, made this prediction to the American Society of Mechanical Engineers meeting in Detroit.

"If plans we saw are carried out," Mr. Bean said, "Russian factories will have the machinery and techniques to make giant production strides by 1960. By 1965 many of their production facilities will be comparable to ours, and by 1970 their production facilities and techniques may be superior to ours unless a new emphasis is placed on automated production in this country."

Mr. Bean credited an organization in Moscow known as the Experimental Scientific Research Institute for metal-cutting machine tools ("ENIMS") as the driving force behind the Russian effort in automation. "ENIMS" controls the design of all machine tools made in Russia. Its overall mission, Mr. Bean stated, is the improvement of machine tools. To this end it sees that Russian industry builds and uses only the latest industrial improvements, including automation.

The American automation specialist also reported the following about the present comparisons between the two nations:

1. On the whole, the Russian plants visited were not as productive as U. S. plants. They are not as well-organized, not as clean and not as well-lighted.

2. Much of the machinery is old, but most of it is in good condition and being used to good advantage.

3. Many of the adverse conditions in Russian factories are being changed rapidly.

4. Over all, the interest in automation appeared to be greater in Russia than it is in the United States.

5. The Russians no longer build manual production machines if automated lines can be made.

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MEDICINE

"Physician, Heal Thyself" Doctors Need Physicals

➤ DOCTORS ATTENDING the American Medical Association, meeting in San Francisco, were advised to have regular physical examinations.

A review of the results of annual physical examinations given to the doctors at the last three A.M.A. meetings indicates that doctors' health records are rather poor.

Of the first 3,228 electrocardiograms, measures of the activity of the heart muscle, 18% were found to be either "definitely abnormal or borderline." Of 2,749 chest photofluorograms, 18% showed suspected or definite abnormalities including tuberculosis, chest neoplasms and cardiovascular abnormalities.

Previous studies of physicians' health have indicated similar percentages of difficulties and have also shown a higher annual death rate, especially from diseases of the heart and coronary arteries, for physicians than for their counterparts in the general population.

Dr. Charles E. McArthur, Olympia, Wash., further explained to colleagues attending the meeting the reasons for the higher death rate due to heart disease are nervous tension, insufficient exercise, inadequate or incorrect diets, and the doctor's lack of attention to his own health.

For the general practitioner, the recommended treatment was to see only one kind of patient, such as obstetrical patients, one morning of the week. This may relieve nervous tension.

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ANTHROPOLOGY

Trace Man's Progress

Radiocarbon dating of specimens dug from the soil of the Near East has given anthropologists evidence of mankind's progress from cave to city dweller.

➤ THE STORY of mankind's development from a primitive cave-dwelling creature to a city-dwelling builder is pieced together from radiocarbon dates of specimens dug from the soil of the Near East.

The story is sketched and the many important gaps in it pointed out by Prof. Robert J. Braidwood of Oriental Institute and the University of Chicago in *Science* (June 20).

The Near East may have been the cradle of Modern Man, Dr. Braidwood says, and even before modern man made his appearance, tools, a knife made of flint, were in use there.

More than 10,000 years ago man began to emerge from his caves and live in the open air. This was an era of "incipient cultivation" that prefaced the swing from food-gathering to a food-producing stage. People in that long-ago time had flint sickles for reaping, crude milling stones for grinding seeds and a tool that may have been used as an axe or a hoe or as both. At that time, too, there is some suggestion of animal domestication, probably the first domesticated animal being the dog.

A radiocarbon date for such an open-air site is reported in the same issue of *Science* by Dr. Ralph S. Solecki of the Smithsonian Institution, Washington, and Dr. Meyer Rubin of the U. S. Geological Survey. The village site, called Zawi Chemi Shanidar and situated in northern Iraq, was dated from a charcoal sample as about 10,870 years old.

The earliest appearance of a settled village-farming community which was the first to be dated is the village of Jarmo, probably dating back to 7000 B. C.

It is probably very difficult to conceptualize fully, or to exaggerate, the consequences of this first appearance of food production. Human existence took on new dimensions from diet, demography, disease and so on through social organization, politics, religion and esthetics.

Later followed the general spread of agriculture from its earliest home in the upper piedmont and intermontane valleys of the fertile crescent. There wild wheats, barley, sheep, goats, pigs, cattle, and some kind of horse were at home in nature.

The next stage occurred when mutations or hybridization, especially of plants, allowed the domesticated food to be removed from this area.

The new way of life had extended well up the Danube Valley by about 4000 B. C., Prof. Braidwood reports, and by 2500 B. C. it had pretty well covered Europe. It had also gone eastward; wheat was being grown in China by at least 1500 B. C.

Urban civilization in southern Mesopotamia appeared about 3500 B. C. and was followed by the beginning of the Egyptian dynasties around 3000 B. C.

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ENGINEERING

Device Pages Doctors

➤ A POCKET radio that whistles to let you know somebody is trying to reach you by telephone is part of a page-you-anywhere telephone system undergoing tests in the Allentown-Bethlehem, Pa., area.

Doctors, lawyers and other persons who must maintain immediate and economical contact with their offices can be signaled anywhere in the two-city area, C. R. Kraus, Bell Telephone Company of Pennsylvania, told scientists at the American Institute of Electrical Engineers meeting in Buffalo, N. Y.

The system, called Personal Signaling Service, was described as an improvement over similar services now in use or planned by telephone companies.

When using the small pocket signaler selectively tuned to a specific frequency, a customer does not need to remain near his automobile to be paged by radio-telephone, nor does he have to listen, at frequent intervals, through a long list of names being paged before he hears his own.

Here is the way the service works, as explained by Mr. Kraus:

1. A customer's secretary, or other prearranged party having a message to deliver, dials the telephone company's signaling operator and gives her the customer's number.

2. The operator dials the four-digit number and also records the information for billing purposes.

3. The signal tones are transmitted on the 35 megacycle channel to the customer's pocket radio where they set up a pleasant whistle.

4. The customer pushes a button to cut off the whistle and then goes to the nearest telephone where he calls his office, home or other prearranged point to receive the message.

The system has been in operation in the Allentown-Bethlehem area for ten months. Mr. Kraus said the tests have shown the service fulfills a need evidenced by extensive usage and steady growth in the number of customers. Maintenance problems, particularly with the receiver, are greater than had been expected, but improvements are being made. The size, shape and weight of the receiver could be improved, he said.

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READY RELAY—The 20-foot mast and two-and-one-half-foot reflector used by the Marine Corps radio relay set goes up in minutes in the field. Using an extremely narrow message band, the radio operates in super high frequency range and can "send" for a distance of 40 miles. The Raytheon Manufacturing Company, Waltham, Mass., will supply the radio relay sets.

ENGINEERING

Design Test Reactor For Fuel Elements

➤ A NUCLEAR reactor to investigate the effect of extreme nuclear conditions upon reactor fuel elements will be completed in 1958 at the Atomic Energy Commission's National Reactor Testing Station near Idaho Falls, Idaho.

The million-dollar facility is designed especially to deliver a high-intensity, short-duration pulse of nuclear energy without damage to the installation itself. Resembling a small nuclear research reactor, it will be fueled by uranium oxide uniformly dispersed in graphite as a moderator.

The reactor is being designed by Argonne National Laboratory, Lemont, Ill.

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PSYCHIATRY

Sleep Lack Causes Illness

Latent psychopathological symptoms may emerge, a scientist has found, by depriving an individual of sleep for an extended period of time.

➤ DEPRIVING a man of his sleep for an extended length of time may contribute to the emergence of significant psychopathological symptoms that might not have become manifest if normal amounts of sleep were provided.

Dr. Louis Jolyon West, head of the department of psychiatry, neurology and behavioral sciences, University of Oklahoma School of Medicine, Oklahoma City, reported the case of a man voluntarily deprived of sleep for 168 hours and 33 minutes to the meeting of the American Medical Association in San Francisco.

The subject was taking part in a radio broadcasting marathon contest and competing for the "title" and a cash prize. The contestants had fairly comfortable quarters with a doctor in attendance who examined each of the contestants twice a day. The participants took 30-minute shifts at the microphone.

Abnormal behavior was noted in the contestant from the fourth day onward. The subject studied began to experience "memory lapses." Broadcasting performance during these memory lapses was not impaired, although they occurred at frequent intervals and for an increasing period of duration until the contest was stopped.

The patient saw a mannequin standing by a refrigerator at a nearby exhibit and opened the refrigerator door to assist the lady into what he thought was her automobile. During the last two days the contestant became increasingly disorganized, and the broadcasting material was confused, disorganized and rambling.

The contest was finally brought to an end by the attending physician because of progressively psychotic behavior and tremors in the contestant.

Abnormal behavior on the part of the subject studied persisted for a period of many weeks following the seven days of sleep deprivation. Poor financial judgment, increased frequency and severity of "memory lapses" and paranoid ideation were present over a period of three months. It was later discovered that some of these tendencies had been exhibited by the patient previously and were merely latent.

The degree to which sleep deprivation was responsible for the reappearance of paranoid behavior cannot be ascertained, Dr. West said, but loss of sleep was certainly a contributing factor.

Sleep deprivation was one of the methods used by Communist inquisitors in their efforts to obtain the confessions of germ warfare from American flyers during the Korean War.

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PHARMACOLOGY

Test Potent Arthritic Drug

A synthetic steroid, hexadecadrol, has been found to be 25 times more potent than hydrocortisone in treating rheumatoid arthritis.

➤ PRELIMINARY reports on a drug that is many times more potent in the treatment of rheumatoid arthritis than the now commonly used drugs, have been presented by two groups of investigators.

The new drug, a synthetic steroid, is called hexadecadrol. It is not, and will not be for some time, available for general use.

Hexadecadrol was described as 25 times more potent than hydrocortisone and six times more potent than prednisone by Dr. Joseph J. Bunim, clinical director of the National Institute of Arthritis and Metabolic Diseases, Bethesda, Md., at the meeting of the American Rheumatism Association in San Francisco.

In addition, Dr. Edward W. Boland of Los Angeles, who conducted clinical studies in patients with rheumatoid arthritis separately with the same drug, stated that "dosage comparison studies made in 21 patients reveal that its average antirheumatic potency, per milligram, is about eight times greater than that of prednisolone."

The clinical studies indicate hexadecadrol possesses greater anti-inflammatory activity than any corticosteroid now produced, he added.

Dr. Bunim said 16 of 18 patients, previously treated unsuccessfully with other antirheumatic drugs, were treated effectively with the drug. Hexadecadrol brought marked subjective and objective improvement in five patients, moderate improvement in seven and slight improvement in four. In two severe cases, no improvement was noted.

One or another of several minor side effects such as increased sweating, insomnia and transitory skin spots occurred in nine of the 18 patients. However, during the short term test there were no major undesirable side effects, such as high blood pressure, swelling due to accumulation of body fluids, activation of peptic ulcers, or bone fractures, often associated with cortisone or other steroid drugs.

While these reports indicate the drug may be an important therapeutic agent for the treatment of rheumatoid arthritis, the investigators quickly added that at least one more year of careful observation will be needed to confirm these promising results.

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TECHNOLOGY

Light Chopper Aids Study Of Infrared Radiation

See Front Cover

➤ A MECHANICAL "light chopper", a device that can cut a beam of light into "pieces" only a few billionths of a second in length, has been developed.

The device can chop both ordinary and infrared light. This, scientists at Westinghouse Research Laboratories, Pittsburgh, Pa., point out, will aid scientists in their studies of fluorescent light, television picture tubes and high-speed photography.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows a thin light beam as it is broken by the device, a six-sided rotating mirror that is surrounded by an arrangement of five stationary mirrors.

Dr. Max Garbuny, T. P. Vogl and J. R. Hansen of the Laboratories' electronics and nuclear physics department developed the light chopper.

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EDUCATION

Survey Shows College Physics Picture Gloomy

➤ THE STATE of physics in United States colleges and universities is gloomy and it does not promise to get better.

This is shown by a nationwide survey conducted by the American Institute of Physics, New York, and reported by Dr. Elmer Hutchisson, director of the Institute.

The study, Dr. Hutchisson said, discloses there is a shortage of physics teachers, overloaded teaching schedules and a gloomy outlook for the future which potentially affects 100,000 college students taking one course in physics and 16,000 physics majors and graduate students.

The survey, conducted by the Institute's director of education Dr. William C. Kelly, shows:

1. Only 39 out of 490 colleges and universities with a four-year undergraduate major program in physics answering the survey report that their needs for physics teachers are now being met.

2. Almost half of the 490 colleges and universities said their physics teachers are carrying teaching "overloads."

3. Almost half of the schools answering said their physicists' time for resarch and other scholarly activities has been "markedly reduced."

4. It is estimated that 688 Ph.D. physicists are needed to correct the shortages in these colleges and universities.

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MANPOWER

Womanpower Increases

The number of women that are entering the labor force is growing. Today one in three workers is a woman and the proportion is expected to increase.

➤ A "SILENT REVOLUTION" is going on in the United States with regard to the place of women in the working world. And the proportion of women in the labor force can be expected to increase greatly in the near future.

The great change in the role of women was revealed by a two-year study of "Womanpower" made by the National Manpower Council of Columbia University. It is reported to the *American Journal of Orthopsychiatry* (April) by Dr. Eli Ginzberg, director of Staff Studies of the Council.

As many as 28,000,000 women were in paid employment at some time during 1955, the Council found.

This means that one out of every three workers is a woman. The proportion is expected to increase. It is estimated that in the decade 1955 to 1965, the labor force of the U. S. will have to increase by 10,000,000 if the economy is to maintain a rapid rate of advance. Since most men are already employed, such an increase can come about only if 5,000,000 additional women enter the labor force.

But the entry of so many women into the working force of the nation does not mean that women are deserting the home. Three out of five of the women who worked in 1955 were married, Dr. Ginzberg reports. And approximately 40% of all the mothers in the country with children below the age of 18 were in the labor force. Some 3,000,000 mothers with children below school age were working.

Working women were by no means mainly young girls filling in time until the right man comes along. Just about half the women who work are 40 years old or older.

More women than ever before in American history are getting married, about 93 out of every 100. They are marrying younger; 20 years old is the median age.

Women outlive men by an average of six to seven years and marry men three years older than themselves. Thus they must anticipate a period of widowhood of about ten years.

For the first 14 years of life, the schooling of a girl is virtually the same as for a boy. But in high school the parallelism is likely to end. Teachers and counselors advise girls to prepare themselves for clerical or sales jobs, or if they plan to go on to college, for teaching or social work.

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FAST FLASH—Light from a ten-millionth of a second flash provided the light for this photograph. Indiana University chemistry professor Edward J. Bair (right) and Henry Kramer (left), graduate student, are studying the reactions of gases, particularly burning, that take place in a few thousandths of a second.

ROCKETS AND MISSILES

X-7 Withstands Higher Speeds, Heights

➤ A NEW AND HOTTER version of the record-breaking X-7 recoverable missile has been developed ahead of schedule, the Lockheed Missile Systems, Van Nuys, Calif., has announced.

Able to withstand higher speed and altitude demands because of reinforced structures, the new version includes these advances in design:

1. Ability to carry four different types of ramjet engines,
2. Autopilot that responds to commands in one-sixteenth of a second, twice as fast as older X-7,
3. Advanced camera instrumentation permitting twice as much film coverage, and
4. Underwing boosters allowing ground as well as air launches.

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MEDICINE

Coronary Occlusion Can Occur at Almost Any Time

➤ THE OLD SAYING "hard work will never kill you" received some scientific support at the American College of Chest Physicians meeting in San Fransicso.

A study of hundreds of patients who had suffered a coronary occlusion showed that only two percent of the attacks could be associated with severe exertion, Dr. Arthur M. Master, consultant cardiologist at Mount Sinai Hospital, New York, reported.

The percentage of attacks that occurred during sleep, rest, mild, moderate or severe activity coincided with the proportion of the day usually spent in these states. The occurrence of coronary occlusion thus seems to be coincidental with what the sufferer is doing when the attack occurs, Dr. Master said.

The fact that only two percent of the attacks could be associated with severe exertion in a time sense has led him to conclude that the attack happened by chance and the severe physical strain either induced pain or aggravated it.

The study also showed coronary occlusion took place with equal frequency in all types of occupation and all classes of society. Perhaps, Dr. Master noted, it occurred slightly more in those occupations of a physically laborious character.

Coronary occlusion, the cardiologist concluded, is the end result of an arteriosclerotic process by which the walls of the arteries harden and it occurs independently of external influences.

"Effort," he said, "is not a factor in its production."

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A mysterious and sometimes fatal tuberculosis-like disease, *sarcoidosis*, is linked to the Eastern pine tree.

PHYSICS

Find Way for Cutting Costs of Heavy Water

➤ A WAY of cutting the production costs of the heavy water, or deuterium, used in nuclear reactors by concentrating the scarce material with bacteria has been discovered.

The method works in the oceans, and should prove feasible for large-scale production if the bacteria can be grown in sufficient quantity.

The concentrating effect was found by chance when four Government scientists were testing the composition of ocean sediments. They found an unexpectedly high enrichment of normal hydrogen.

Drs. P. E. Cloud Jr., Irving Friedman and F. D. Sisler of the U. S. Geological Survey and Dr. V. H. Dibeler of the National Bureau of Standards report in *Science* (June 13) that deuterium is concentrated in one area of the Bahama Banks.

The bacteria responsible are believed to belong to the genus *Pseudomonas*. The deuterium is concentrated in the residual nutrients, in the bacteria or in the water between the grains of the sediment.

The scientists discovered the bacteria's ability to concentrate deuterium by studying the composition of gas generated by bacteria in sediments collected off the Bahama Banks. Since the gas generated was remarkably low in deuterium, the bacteria must have concentrated it.

Dr. Cloud told SCIENCE SERVICE the discovery was an example of a possibly very practical and totally unexpected by-product of pure research. The Geological Survey is conducting a comprehensive study of the ocean sediments in the Bahamas region. He said he hoped other scientists would make further studies to determine exactly where the deuterium is concentrated.

When working with materials as diluted as ocean water, Dr. Cloud said, it is "much easier to find that something is gone than to find out where it is located."

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MEDICINE

Percentage of Bottle-Fed Newborn Babies Grows

➤ A CONSTANTLY increasing number of babies are taking to the bottle.

A recent nationwide survey shows the percentage of newborn infants that are bottle fed while in the hospital has nearly doubled since 1946.

The first study of newborn infants made in 1946 revealed 36% were bottle fed, 38% were breast fed, and 27% were both bottle and breast fed.

The second study, a decade later, in 1956, revealed that in 1,904 hospitals, 63% of the newborn infants were bottle fed, 21% were breast fed, 16% were bottle and breast fed.

The only evidence that might contribute to the breast feeding decrease found in this study would be that more than three-fourths (84%) of the mothers and infants leave the hospital on or before the first postnatal day, just when or before the maternal lacation is being established, Dr. Herman F. Meyer of Children's Memorial Hospital and Northwestern University Medical School reported at the American Medical Association meeting in San Francisco.

The committee on maternal and child feeding of the National Research Council has listed some reasons given by mothers who do not wish to nurse their babies. They include: the whole idea is disgusting to some mothers whose natural feelings have been distorted; the mother must work; she will lose her figure; she is prone to be nervous; she will get too fat; her husband objects; suckling is unbearably painful; she does not want to be tied down to routine, or she may not want the child and may reject the whole idea of the close contact involved in breast feeding.

The committee concluded the time to correct such attitudes is not in the lying-in period but during pre-birth instruction.

Of the 1,876 hospitals reporting, 49 nurseries have human milk available. Sixty-five have frozen supplies of "this rare commodity." In all but a few exceptions, this reserve of human milk is used exclusively for premature infants.

Science News Letter, July 5, 1958

NATURAL RESOURCES

U. S. Self-Sufficient in Two of 32 Vital Minerals

➤ THE UNITED STATES is truly "self-sufficient" only in magnesium and molybdenum out of the 32 vital minerals.

The greatest contribution of engineers is to do nothing that will further drain our natural resources, Rear Adm. H. G. Rickover, assistant chief of the Navy's Bureau of Ships for nuclear propulsion, said.

He told young engineers graduating from Stevens Institute of Technology the U. S. is no longer one of the world's richest countries in mineral and fuel resources. Adm. Rickover, who is also chief of the Atomic Energy Commission's naval reactors branch, said this country is now importing many vitally needed materials, whereas it was once a great exporter of raw materials.

This change occurred in the last 25 years and should be taken into account by the engineer in his planning. Adm. Rickover cited an example concerned with building a bridge across a body of sea water with valuable oyster beds. The selected location ruined the beds, but a small change of location would have saved them and the livelihood of many persons.

"Engineers," Adm. Rickover said, "build structures which alter man's supply of pure air and water, of food and soil.

"A poorly designed factory may poison air and water; a dam or highway may needlessly rob our grandchildren of good farm land which by then may well be in short supply.

"Almost everything the engineer does has an effect on our materials base. His work is seldom purely an engineering task, though he sometimes acts as if it were."

Adm. Rickover urged that consultation with other experts by engineers become as common as it is among doctors.

Science News Letter, July 5, 1958

IN SCIENCE

ROCKETS AND MISSILES

Report Reason Explorer's Radio Resurged to Life

➤ THE REASON Explorer I's apparently dead radio resurged to life for about four days was reported to the American Rocket Society meeting in Los Angeles.

Dr. Eberhardt Rechtin of the Jet Propulsion Laboratory, Pasadena, Calif., said the resurgence resulted from the internal circuit connections of the two batteries and showed that, when testing for the lifetime length of batteries, "you should do it long after your unit is dead."

Dr. Rechtin also reported on the reception of "ghost satellite" radio signals from Russian sputniks. Under certain conditions the broadcast beamed at 40 megacycles was recorded at a receiving station 180 degrees away on the earth from the satellite's true position. The signal had much the same characteristics as if the satellite had been overhead.

The explanation is that the radio waves were trapped by the earth's magnetic field or that they were trapped in a rather peculiar way by the ionosphere, with the result that they reached the listener in exactly the right phase.

Dr. H. W. Wells of Carnegie Institution of Washington first reported hearing the "ghost signals."

One important fact learned about tuning in on instruments broadcasting from outer space, Dr. Rechtin said, was to "believe the instruments rather than preconceived ideas of physics." As an example, he cited the extremely high counts of cosmic rays made at some stations, which sometimes caused the telemetering channel to appear to be working improperly when actually the instrument had become saturated.

Science News Letter, July 5, 1958

NUTRITION

Mother Dogs Need Three Times More Food

➤ A MONTH or so after their pups start nursing, female dogs need about three times the amount of food they normally eat. Energy, or calories, seems to be the major need at this time. A dog nursing less than five pups does not need quite three times the normal amount of food.

These facts were shown by records kept during nutrition studies by P. H. Philips and J. A. Ontko, University of Wisconsin biochemists. The researchers said the dogs might have eaten even more at that stage of lactation, but their digestive tracts could hold no more.

If sufficient nutrients are not available at this time, the dog must obtain them from stored nutrients or from body tissue.

Science News Letter, July 5, 1958

NCE FIELDS

AGRICULTURE

Reclaimed Tidal Basins May Solve Land Shortage

➤ SAN FRANCISCO Bay area may be 159,000 acres of dry land bigger by taking over some of the sea.

Tidal flats and shallows are now under study for reclamation possibilities, V. S. Aronovici told scientists at the American Society of Agricultural Engineers meeting in Santa Barbara, Calif. There is no reason, he said, why Americans cannot salvage submerged land just as the Dutch have done for centuries.

Literally hundreds of thousands of submerged lands and marshes bordering the United States' coast could be reclaimed for farming.

Urban expansion and a steadily growing population have caused a shortage of farmland near metropolitan areas.

Mr. Aronovici, a U. S. Department of Agriculture engineer, pointed out a detailed study of soil conditions of the submerged land is necessary before reclamation can start.

Science News Letter, July 5, 1958

MEDICINE

Alcohol Death May Be Due to Circulatory Failure

➤ THE TREATMENT of severe alcohol intoxication in man will probably be changed as a result of animal experiments.

Treatment had been based on the assumption that death, if it results, will probably be due to respiratory failure.

The experimental animals consumed alcohol either by mouth or injection until they had taken a lethal amount. It is the first time animals have been observed who consumed a lethal dose of alcohol. Previously the biochemical and physiological effects of smaller doses of alcohol have been reported, Drs. Gerda I. Klingman of the Johns Hopkins University and Harvey B. Haag of the Medical College of Virginia in Richmond comment in the *Quarterly Journal of Studies on Alcohol* (June).

Of the animals that took alcohol by mouth, about 65% died within 12 hours and these animals seemed to die of respiratory failure. But with the other 35%, respiratory rate and depth were relatively unchanged but the blood pressure showed a progressive drop so that death was finally due to circulatory failure. These animals lived longer than 12 hours, however.

Alcohol given the animals by intravenous injection always caused death by respiratory failure.

Both oral and intravenous lethal doses of alcohol produce an excess of glucose in the blood. Animals that had only a moderate rise in plasma glucose usually died within 12 hours of respiratory failure. Those in which the rise in glucose was marked usually lived longer than 12 hours and death was preceded by a drop in blood pressure.

One finding in the experiments indicates present knowledge of the blood alcohol levels of men who die of alcohol intoxication may be misleading.

With few exceptions, animals given a lethal dose of alcohol by mouth die at a time when the blood alcohol concentrations are going down. The findings indicate that at the high alcohol levels destructive changes are begun which continue until death even though the body is able to eliminate some of the alcohol in the meantime.

Science News Letter, July 5, 1958

SURGERY

Hypnosis Tests Brain Damage in Heart Surgery

➤ HYPNOSIS has been successfully used during open heart operations.

Two teen-aged patients were hypnotized and then given small amounts of anesthesia. Hypnosis was used in these cases to avoid the depressant effects of anesthetic drugs. Furthermore, by controlling unconsciousness while the patient was on the heart-lung machine, the doctor was able to check on the possibility of brain damage, one of the dangers present in the use of the heart-lung machine.

One of two patients who underwent hypnosis awoke on command while her heart was temporarily by-passed and a heart-lung machine had taken over its work.

The first patient, a 13-year-old boy, received certain posthypnotic suggestions during preliminary interviews and during the operation, Dr. Milton J. Marmer of Beverly Hills told the American Medical Association meeting in San Francisco.

There was a marked absence of complaint of pain during the postoperative period, he pointed out. The boy remained placid, calm, relaxed and cooperative through the postoperative course and was discharged on the 30th day in good condition.

After this first successful attempt with hypnotism, it was decided that the second patient, a 14-year-old deaf girl, would be awakened during the operation, if possible. Thus brain damage could be detected.

She was hypnotized and given a small amount of anesthesia. She was placed on the heart-lung machine, her heart opened, and a hearing aid placed in her ear, so that she could hear instructions.

When told to open her eyes, she responded readily. She also moved her head to indicate that she could hear and understand.

After the defect was repaired and the heart closed, she was given instructions to sleep again. She slept until the entire operation was completed. At that time she was told to awaken.

She was discharged from the hospital 20 days later, in good condition, Dr. Marmer said.

Science News Letter, July 5, 1958

PUBLIC HEALTH

Predict Radiostrontium Bone Levels From Diet

➤ PREDICTION of bone levels of hazardous radiostrontium that might be expected from fallout contamination of food is now possible.

Samples of human rib bones, cow's milk, vegetables and dairy cattle feed were collected from five regions in the United States. They were: 1. Phoenix, Ariz.; 2. Sacramento, Oakland, Fresno and Los Angeles, Calif.; 3. Tulsa and Oklahoma City, Okla.; 4. Philadelphia, Pa., and Albany and Rochester, N. Y.; and 5. Madison, Wis., and Minneapolis, Minn. Regions were selected on the basis of different strontium to calcium ratios in soil.

All samples were analyzed for strontium and calcium. This was naturally-occurring (non-radioactive) strontium. Living matter, however, utilizes the natural and fallout product alike.

From this study the investigators were able to determine approximately the amount of strontium a person may retain from a given diet and thus to predict radiostrontium bone levels from contaminated food supply.

The level at which bone radiostrontium becomes a human health hazard has yet to be determined, the UCLA scientists emphasized.

We receive most of our strontium from vegetables, the investigators point out. Meat and eggs contain very little. Milk contributes relatively little strontium because a cow "filters" out much strontium in converting feed to milk.

The study was carried out at the University of California at Los Angeles by George Alexander and Dr. R. E. Nusbaum of UCLA's Atomic Energy Project.

Science News Letter, July 5, 1958

ENGINEERING

Astronomy Technique Measures Scratches

➤ HOW DEEP is a scratch?

That is a question that long has posed problems for scientists who have needed to measure the depth of tiny scratches on vital metal parts. Astronomy has provided the solution.

Engineers are using an instrument that looks like a miniature telescope and they are measuring scratches the same way an astronomer measures the depth of a crater on the moon.

Boeing Airplane Company engineers have developed a compact optical instrument that directs a beam of light into the scratch at a precisely determined angle. The instrument automatically measures the length of the shadow formed.

The involved trigonometrical calculations needed to relate light angle and shadow length to scratch depth are performed simply by turning a calibration knob on the device.

The depth of scratch is given automatically.

Science News Letter, July 5, 1958

MEDICINE

Hospital of the Future

Hospitals of the future are designed to suit the patient who wishes as short a stay as possible with as little cost as possible.

By HELEN BUECHL

➤ THE NEXT TIME you go to the hospital for treatment, instead of ordering you to bed immediately, the nurse may ask you to operate one of the elevators for a few hours. Or, a day after an operation, you may walk to the hospital cafeteria for your meals instead of eating them in bed.

These are examples of the new thinking, new planning and new policies which may soon evolve in many of the 7,000 hospitals in the United States. Called "progressive patient care," the plan is more closely designed to fit the hospital to the patient's needs.

At present in most U. S. hospitals every patient, regardless of his or her condition, has identical equipment, facilities and services. Whether the patient underwent a critical operation yesterday or is preparing for departure in an hour, all of the complex hospital forces are poised at hand for the patient's service.

Bedside oxygen and suction equipment; a bed with tucked away pulley devices; the continual availability of expert nursing surveillance; all can be essential to the patient who needs these services.

But what about the patient who does not need them? They still cost money, whether they are used or not. Many patients are housed in these well-equipped rooms when they could be convalescing in simpler, less expensive ones.

Furthermore, every patient who enters the hospital is not so ill that he need be put into pajamas, put to bed and waited upon. This is very boring for many patients who are well enough to be up and around for the majority of the daytime hours.

Constructive Activity Needed

Psychologically, the patient is much better off if he can do something constructive during the day. Perhaps he could get his meals at the hospital cafeteria, or help in some small way right at the hospital to relieve the boredom of dreary hours.

The U. S. Public Health Service is currently conducting a survey of some 7,000 hospitals to find what, if any, progressive care has been initiated. One such hospital is the Manchester Memorial Hospital in Manchester, Conn.

Edward J. Thoms, administrator of the 189-bed Manchester Hospital, has already begun a "progressive patient" system. Mr. Thoms' plan combines three extremes in hospital care. The patient is gradually placed in transition from special surveillance to self-help. This type of service can work in reverse, also. The plan might move in a circle, from diagnostic examination in the self-help unit, to surgery and the intense care unit, back to self-help again.

The self-help unit of the hospital provides hotel-like rooms where the patient dresses himself, bathes, and finds freedom during the daytime hours. And, it is less expensive.

The cost scale at Manchester is $22 per day for the intensive care unit, with continuous nursing surveillance, $18 for the intermediate care unit, and $11 per day for the self-service unit, where service by a registered nurse is minimal and the patient is able to care for himself.

Progressive Care Benefits

Although individual costs may be less under progressive patient care, its really big advantage lies in much better care for the patient's hospital dollar, Dr. Edward T. Thompson, director of the Public Health Service study, has noted. Dr. Thompson is chief of intramural research activity for the division of hospital and medical facilites, Department of Health, Education and Welfare.

Other benefits which could be realized from a change to the "progressive patient care" plan, he said, include:

1. Closer contact between the hospital and the attending doctor. Only the doctor would decide when and if the patient should be transferred from one unit to another. Under the present setup, the doctor has little, if any, direct contact with the hospital.

2. Substantial reduction in the over-all construction and operating costs. Expensive equipment for the intensive care unit would be installed in only one section of the hospital. Design and architecture of the buildings would change, as a result.

3. The prospect of accumulated savings, due to these reductions, might very well bring costs within the means of communities which now, in the midst of recession, are struggling with the problem of financing new hospitals or enlarging existing ones.

4. The skill of trained medical personnel would be used to more advantage by concentrating it in the intensive care unit where it is needed.

5. With more effective care, concepts of medical economics regarding the number of hospital beds per so many thousands of population would become more adjusted to actual needs.

6. The existing premiums for hospitalization insurance could be changed to a per unit rate, each unit rate costing a proportionate amount. Policy holders could have the option of paying premiums for all three units of hospital care, two units, or one.

A SELF-CARE UNIT—Crowell House at Manchester Memorial Hospital in Connecticut is reserved for self-care patients. Here, hotel-like rooms are occupied by those who are able to help themselves. Such a patient is Harold Borst who was admitted to Crowell House on the basis of bizarre symptoms. He required a complicated physical examination after which he was released to his private doctor.

Already there is some solid evidence from Manchester that patients are not only getting better care under the new plan, but are experiencing a briefer hospital stay at less cost to them and to the hospital, Milton Golin, assistant to the editor, reported in the *Journal of the American Medical Association*.

Reorganization Plan

A reorganization plan has been worked out by Dr. Aims C. McGuinness, special assistant to the Secretary for Health and Medical Affairs, Department of Health, Education, and Welfare. It consists of five units. They are:

Intensive care—for a patient with a severe condition who needs constant nursing attention with lifesaving devices at hand.

Intermediate care—for the patient who does not need intensive treatment, but must remain in bed.

Self-care—for the patient with a minor ailment or one who has nearly recovered from a serious one. This patient is able to leave his bed for a bath or a walk to the hospital cafeteria.

Long-term care—for the patient who is aged or who has a lingering ailment which requires many weeks of hospitalization.

Home care—for the patient who comes to the hospital for quick treatment and can be sent home almost immediately.

This plan is specifically designed to eliminate such problems as the overly elaborate hospital where some patients come in only for a check-up or diagnosis.

Now, the average nursing unit consists of one or two seriously ill patients mixed with a few who need moderate care, plus some long-term patients and one or two who need almost no attention. The new plan will eliminate such imbalance.

Even the hospital staff itself has been known to be so overburdened with extra duties that the trained and professional help was bogged down with time-consuming duties. Such a case was that of the nurses of a Tennessee hospital.

It was discovered that the head nurses were doing so much clerical work that they had little time to supervise the care of the patients.

Better Care for Less

Today, about one-third of the population, more than 50,000,000 people, have no hospital insurance whatsoever. One of the major aims of this plan is to reduce the cost of the average hospital stay and eliminate the needless expenditure on equipment. More and better shortcuts resulting in greater efficiency are on the agenda for the future.

Certainly the hospital of the future has great potential. It may not be too long before these revolutionary ideas are in practice throughout the nation.

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Even if all forest land in the U. S. capable of growing commercial crops of *trees* is put fully to work, this country may have difficulty in meeting its future timber needs.

GENERAL SCIENCE

Soviet Elects U.S. Scientists

➤ TWO RUSSIAN scientists are members of the United States National Academy of Sciences and have been for more than a decade.

On June 21 the Soviet Academy of Sciences in Moscow announced Dr. Detlev W. Bronk, president of the U. S. National Academy of Sciences, and Dr. Linus C. Pauling of the California Institute of Technology had been awarded full membership in the Russion Academy.

The two Russians, who are foreign associates of the American Academy, are:

Dr. Peter L. Kapitsa, a world-famous physicist specializing in low temperature studies and credited with master-minding the Russian sputnik successes. Dr. Kapitsa, who refused to have anything to do with the Soviet atom bomb effort and was punished accordingly, was weaned away from England's Cambridge University in 1934. He was elected to the National Academy of Sciences in 1946.

Dr. Paul Alexandroff, a mathematician at the Mathematical Institute of the Russian Academy of Sciences. Dr. Alexandroff who was elected to the National Academy of Sciences in 1947, ironically, was not elected to the Soviet Academy until 1953.

Foreign associates of the National Academy of Sciences have the privilege of attending meetings and of reading and communicating papers to the Academy. They are also entitled to receive the papers of the Academy. They cannot, however, take part in the Academy's business nor are they subject to its assessments.

Dr. Bronk expects to meet his Russian counterpart, Alexander Nesmeyanov, sometime this summer when he will travel to the Soviet Union to discuss the exchange of scientists between the two countries. Under an agreement made with former Russian ambassador Zaroubin it was specified that the heads of the Academies of both nations would meet in Moscow to discuss future exchanges.

Curiously, the first American to be honored by the Russians with election to their scientific society was Benjamin Franklin, who in 1789 was made a membr of the Imperial Academy of Sciences of St. Petersburg.

The U. S. National Academy of Sciences is a private non-profit corporation established by an Act of Congress, approved by President Lincoln March 3, 1863, to further science and advise the Federal Government, upon request, in scientific and technical matters.

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MEDICINE

Device "Sees" Behind Eye

➤ AN ULTRASONIC technique now makes it possible to examine areas of the eye formerly too difficult to reach.

Physicians had had no instruments for examining the areas behind the eye and so could only surmise what disease processes might be taking place in these areas.

But now, with the ultrasonic technique, a cross sectional view of the eye and the areas behind the eye may be obtained, even when the tissues are totally opaque to light, because the "seeing" is accomplished by high frequency sound waves instead of by light or X-ray, an ophthalmologist reported at the American Medical Association meeting in San Francisco.

The ultrasonic device operates on a sonar principle. A burst of high frequency sound is transmitted. When the sound waves strike an object in their path, a return echo is set up. The ultrasonic echo is picked up by a special microphone, capable of responding to high frequencies, which converts the sound into electrical energy.

The electrical energy is converted into light in a manner similar to the operation of a television receiver.

To obtain an over-all view of the eye, the transmitter and receiver are moved in a sweeping motion over the eye. Echoes reflect from different portions of the eye to a radar receiver. The radar receiver then displays the interior of the eye and the orbit, Dr. Gilbert Baum of the Veterans Administration hospital in the Bronx, N. Y., and the department of ophthalmology of New York University Post Graduate Medical School, explained.

Diseases of the eye that formerly were beyond the range of known instruments but have now been "seen" included: Tumors obscured by cataract, certain types of intraocular foreign bodies that were invisible to X-ray and a detached retina in an eye opaque to light because of a hemorrhage in the back of the eye, Dr. Baum said.

He was assisted in the development of the instrument by Ivan Greenwood, physicist for Avionics Division of General Precision Laboratories of Pleasantville, N. Y.

Science News Letter, July 5, 1958

MEDICINE

Cholesterol Unreduced By Safflower Oil

➤ ADDING unsaturated oil (safflower oil) to a normal diet does not reduce the level of cholesterol in the blood, tests on 24 young men have shown. Dr. Irving S. Wright, Dr. Richard Perkins and Miss Barbara Gatje, New York Hospital Cornell Medical Center, did the study reported to the New York Heart Association because many researchers have felt that lowering this level can prevent or slow down the development of atherosclerosis.

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ABORTION IN THE UNITED STATES—Mary Steichen Calderone, Ed., introduction by M. F. Ashley Montagu—*Hoeber-Harper*, 224 p., $5.50. Report of a conference sponsored by the Planned Parenthood Federation of America, Inc. at Arden House and The New York Academy of Sciences.

ADVANCES IN PETROLEUM CHEMISTRY AND REFINING, Vol. I—Kenneth A. Kobe and John J. McKetta, Jr., Eds.—*Interscience*, 641 p., illus., $13.50. A series of critical evaluations of new developments in petroleum refining and in petrochemicals.

ANALYTIC GEOMETRY PROBLEMS—C. O. Oakley—*Barnes & Noble*, 253 p., paper, $1.95. Review of basic principles, keyed to standard textbooks.

COLORING BOOK OF THE SMITHSONIAN INSTITUTION: An Educational Book to Read and Color—*Smithsonian*, 32 p., illus., paper, 50¢. To arouse in children an interest in the wonders of nature and man's ingenuity.

COMMISSION V ON RADIOASTRONOMY: Proceedings of the XIIth General Assembly, Boulder, Colo. 1957, Vol. XI, Part 5—*International Scientific Radio Union*, 148 p., paper, $4. Membership list and some of the reports and papers submitted to the Commission.

CONTAINMENT STUDY OF THE ENRICO FERMI FAST BREEDER REACTOR PLANT—E. M. Fisher and W. R. Wise, Jr.—*Office of Technical Services*, 31 p., illus., paper, $1. Investigates the capability of the Enrico Fermi nuclear power plant to contain an accidental explosion.

THE EDGE OF TOMORROW—Thomas A. Dooley—*Farrar, Straus*, 208 p., illus., $3.75. The true story of six Americans who in the spirit of Albert Schweitzer went to Laos to set up a jungle hospital.

ELECTRONIC MEASURING INSTRUMENTS—E. H. W. Banner—*Macmillan*, 2nd rev. ed., 496 p., illus., $7.95. Written for the instrument engineer, instrument user, and the advanced student.

THE EVOLUTION OF GENETIC SYSTEMS—C. D. Darlington—*Basic Bks.*, rev. ed., 265 p., illus., $5.50. Attempts to join together the relatively fixed world of physics and the moving world of biology. The author is led by a belief in the connectedness of the processes of life.

EXISTENCE: A New Dimension in Psychiatry and Psychology—Rollo May, Ernest Angel and Henri F. Ellenberger, Eds.—*Basic Bks.*, 445 p., $7.50. Existential psychology tells us that Western man, in freeing himself from the drive-pressures of hunger, disease and fatigue, has run headlong into a vacuum where boredom and meaninglessness usurp his being.

THE FASCINATING WORLD OF BUTTERFLIES—Adapted from Charles Ferdinand's "Les plus beaux Papillons" by L. Hugh Newman—*Hanover House*, 93 p., color photographs, $4.95. Species from all regions and climates in all their exotic colors and shapes.

FRONTIERS IN SCIENCE: A Survey—Edward Hutchings, Jr., Ed., commentaries by L. A. DuBridge, George W. Beadle, Harrison Brown, and Hunter Mead—*Basic Bks.*, 362 p., illus., $6. A guided tour of their laboratories, observatories, and field stations, by leaders of scientific research.

THE HANDBOOK OF PRIVATE SCHOOLS: An Annual Descriptive Survey of Independent Education, 1958—*Porter Sargent*, 39th ed., 1132 p., illus., $10. New feature is inclusion of foreign private school facilities.

A HISTORY OF TECHNOLOGY, Vol. IV: The Industrial Revolution *c*1917 to *c*1850—Charles Singer and others, Eds.—*Oxford Univ. Press*, 728 p., 48 plates, $26.90. Fourth of five volumes which will cover the subject from the Old Stone Age to the later nineteenth century. For the general reader, written with few specialist terms.

MAN, METALS AND MODERN MAGIC—J. Gordon Parr—*Am. Soc. for Metals*, 238 p., illus., $2.95. The story of what metals did to man, from 6,000 B.C. to the present day.

MENTAL HEALTH: A Ford Foundation Report—*Ford Foundation*, 40 p, illus., free upon request direct to publisher, Office of Reports, 477 Madison Ave., New York 22, N. Y. A non-technical account of mental health activities supported by the Ford Foundation.

THE METAL MOLYBDENUM: Proceedings of a Symposium sponsored by Office of Naval Research—Julius J. Harwood, Ed.—*Am. Soc. for Metals*, 696 p., illus., $12.50. Up-to-date picture of the status of molybdenum as a structural material which can withstand temperatures above 1800° F, but still lacks resistance to oxidation at such temperatures.

THE MOTILITY OF MUSCLE AND CELLS—Hans H. Weber—*Harvard Univ. Press*, 69 p., illus., $3.50. Experimental data showing clearly the conditions in the interior of muscles and cells necessary for contraction and relaxation.

ON TWO PARAMETERS USED IN THE PHYSICAL THEORY OF METEORS—Luigi G. Jacchia—*Govt. Printing Office*, Smithsonian Contributions to Astrophysics, Vol. 2, No. 9, 7 p., paper, 15¢.

PERFORMANCE OF METAL-CUTTING TOOLS—R. Tourret—*Butterworth & Co. (Canada)*, 184 p., illus., $10. Man's ability to shape metal according to his needs is one of the cornerstones of our civilization. The broad principles of metal-cutting and the present stage of knowledge are here reviewed.

PESTICIDE HANDBOOK 1958—Donald E. H. Frear, Ed.—*Pa. State College*, 10th anniv. ed., 220 p., cloth, $3., paper, $1.50 Gives trade names, ingredients, uses, and manufacturers of 6,128 products.

PRINCIPLES OF GEOCHEMISTRY—Brian Mason—*Wiley*, 2nd ed., 310 p., diagrams, $8.50. Concerns the chemistry of the earth and provides a coherent account of the physical and chemical evolution of our planet. A one semester course.

THE PSYCHOLOGY OF INTERPERSONAL RELATIONS—Fritz Heider—*Wiley*, 322 p., $6.25. Analyzes complex interpersonal relations in terms of a few basic elements and factors, such as perception, common sense ideas, the effects of action, ability, exertion, and others.

RADAR-SYNOPTIC ANALYSIS OF AN INTENSE WINTER STORM—Edwin Kessler, III—*Office of Technical Services*, 218 p., illus., paper, $3.50. Demonstrates that radar measurements have great semiquantitative value for determinations of vertical velocity distributions in most rain or snow precipitations.

SELECTED WRITINGS OF JOHN HUGHLINGS JACKSON, Vol. I: On Epilepsy and Epileptiform Convulsions; Vol. II: Evolution and Dissolution of the Nervous System, Speech, Various Papers, Addresses and Lectures—James Taylor, Ed. assisted by Gordon Holmes and F. M. R. Walshe—*Basic Bks.*, 1010 p., illus., $15 the set. After being long out of print, here are the principal writings of one who thoroughly revolutionized the foundations and practice of modern neuropsychiatry.

STANDARD AIRCRAFT HANDBOOK—Stuart Leavell and Stanley Bungay, Eds.—*Aero Publishers*, 2nd ed., 160 p., spiral bound, $2.75.

THE STATUS OF SECONDARY SCIENCE EDUCATION IN THE STATE OF OHIO—Charles L. Koelsche—*Toledo Univ. Research Foundation*, 29 p., paper, single copies free upon request direct to publisher, Toledo 6, Ohio. Based on a survey of 159 high schools.

THE STORY OF TRANSPORTATION—E. John Long—*Smithsonian*, 36 p., illus., paper, 50¢. As told by historic originals and scale models in the Smithsonian Institution. Includes color stamp sheets.

THEORY OF PSYCHOANALYTIC TECHNIQUE—Karl Menninger—*Basic Bks.*, 206 p., illus., bibliography, $4.75. The product of both subjective and objective experience with patients and students, this book is a written version of the author's seminar presentations.

THINKING: An Experimental and Social Study—Sir Frederic Bartlett—*Basic Bks.*, 203 p., diagrams, $4. Tries to put thinking into its place as a natural development from earlier established forms of bodily skilled behavior. Discusses experiments made and suggests others.

UPPER CRETACEOUS OF THE PACIFIC COAST—F. M. Anderson—*Geol. Soc. of Am.*, Memoir 71, 378 p., illus., $6.75. Result of the late author's study of the fossils of the Upper Cretaceous of California and Oregon.

YOUR PET COCKATIEL—Alice L. Sadler—*All-Pet Bks.*, rev. ed., 40 p., illus., paper, 50¢. All about a winning little household pet.

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ENGINEERING

Radioactivity Measures Jet Nozzle Wear

➤ MICROSCOPIC wear of fuel nozzles in jet aircraft can be measured with precision accuracy by radioactivity methods.

Explaining how even minute amounts of wear in a nozzle spewing jet fuel under high pressure can seriously affect efficiency, H. R. Hazard, P. Gluck, and R. W. Tate of the Battelle Memorial Institute, Columbus, Ohio, described a method for measuring wear quickly, at at reasonable cost, to the American Society of Mechanical Engineers meeting in Detroit.

The engineers said their system was to make the nozzle parts radioactive, and then to circulate through them a stream of hot fuel.

Later measurements of the fuel for radioactive residue reveal that it permits investigators to measure wear of parts as little as 1/1,000,000 of a gram per hour. Visual inspection requires 100 hours or more before visible erosion occurs.

Science News Letter, July 5, 1958

MEDICINE

X-Rays Endanger Fetus

More accurate methods of measuring radiation intensity has raised some questions as to the wisdom of taking X-rays except when absolutely necessary.

➤ STUDIES IN PROGRESS show the incidence of leukemia and other malignant diseases in early childhood may be increased by the diagnostic use of pelvic X-rays late in pregnancy.

This was reported to the American Medical Association meeting in San Francisco by Dr. Edward L. King of the School of Medicine, Tulane University, New Orleans, La.

"The disastrous effect of heavy X-ray doses of the fetus in early pregnancy," Dr. King said, "has long been known, but it was thought that the dosage of diagnostic X-ray, especially when used late in pregnancy, was so small that no damaging effects were produced."

Dr. King pointed out the development of more accurate methods of measuring the intensity of radiation and recent studies on the effects of radiation have given rise to doubts as to the wisdom of unrestricted use of X-ray examination of the pelvis.

A study made in England, he said, showed that in children under ten years of age who were dying of leukemia or other malignancies, the percentage subjected to prenatal abdominal radiation was 13.3% as compared to 7.4% for the control group.

Similar results were obtained in a Louisiana study in which 27.3% of the leukemia cases and 29.5% of the other malignancies in children under ten years had been exposed to prenatal X-rays as compared to 18.4% in the healthy controls of the same age.

In the English study several groups of twins were found with one affected child and one healthy child. It is believed, the Louisiana scientist said, that the diseased twin was in front of the other when the X-ray was made.

It is also possible, Dr. King said, that diagnostic irradiation may produce mutations in the genes of the mother or the child, the effect of which may not be manifest for many generations.

Dr. King and his associates at Tulane, Drs. Isadore Dyer, John A. King and Millicent J. Hoffman, conclude "careful clinical studies of the pelvis will suffice in 70% to 80% of obstetrical patients" and therefore routine X-ray examination of the pelvis is not recommended.

X-Ray Program Urged

➤ REPLACEMENT of compulsory X-ray programs with the tuberculin skin test in areas that experience a low incidence of cases has been urged by three Federal agencies.

The skin test was recommended as a substitute for chest X-rays in students and school employees by the Public Health Service, the Office of Education and the Children's Bureau.

Chest X-rays could then be limited to those whose skin tests were positive.

The Public Health Service some months ago recommended that X-ray surveys be conducted on a selective rather than on a mass or communitywide basis.

Tuberculosis case-finding is an important factor in school and college health programs. In the light of changing conditions, however, the value of mass X-ray programs should be weighed against costs and radiation exposure.

Science News Letter, July 5, 1958

MEDICINE

New Enzyme Discovery Linked to Gouty Arthritis

➤ A NEW ENZYME has been isolated that appears to play an important role in the causative process of gout and gouty arthritis.

The enzyme, called uric acid riboside phosphorylase, has been found to act upon a body chemical, uric acid riboside. The enzyme splits this chemical into two components, a type of body sugar and free uric acid. A high level of free uric acid has long been associated with gout, Dr. Leonard Laster, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md., said.

"The existence of the new enzyme implies there may be an alternate pathway for uric acid metabolism, producing free uric acid from uric acid riboside," Dr. Laster reported to the American Rheumatism Association meeting in San Francisco.

Gout is a poorly understood metabolic disease often accompanied by acute attacks of an especially painful form of arthritis. The disease usually affects the joints of the feet and brings on attacks of inflammation and extreme pain.

It is caused by an inherited disorder of metabolism, or body chemistry, in which excessive amounts of uric acid appear in the blood. Some of this uric acid crystallizes out in the form of urate salts which are deposited in various parts of the body and may produce marked damage to body tissues, leading to the chronic form of the disease.

The splitting action of the new enzyme is inhibited by the old remedy for gout, colchicine. However, the exact role colchicine has been playing in relieving the pain of gouty arthritis has never been found. This latest discovery may prove to be the stepping stone toward an explanation of colchicine's action.

Science News Letter, July 5, 1958

Questions

CONSERVATION—What new proposal has has been made to aid conservationists? p. 4.

MANPOWER—What percentage of the American labor force is composed of women? p. 7

PSYCHIATRY—How does lack of sleep affect an individual's behavior, according to observations of one person? p. 6.

Photographs: Cover, Westinghouse Electric Corporation; p. 3, Bell Aircraft Corporation; p. 5, Raytheon Manufacturing Company; p. 7, Indiana University; p. 10, Manchester Memorial Hospital; p. 15, General Electric Research Laboratory; p. 16, Jobar Industries, Inc.

Do You Know?

An electron *accelerator* creates a high-energy stream of positively charged protons or negatively charged electrons which bombard matter under study.

A relationship between *spinal arthritis* on the one hand and luekemia and heart disease on the other has been discovered.

The rapid, deep breathing that results from heavy doses of *aspirin* is one way of helping rheumatoid arthritis patients to increase their range of motion and muscle strength.

MANPOWER

Women Scientists Use Their College Training

➤ "ENTHUSIASTIC" is the way some 276 Barnard College alumnae feel about their scientific training, according to a report published by the women's college.

Their responses to a questionnaire indicate their six to ten years of training is worthwhile if for no other reason than to attract more young persons into science through teaching. Most are now working as teachers, researchers or in other fields of science.

Asked about the role of women in science, almost half pointed out that a woman's patience for detail, her acceptance of routine and her success in work involving personal contact place her ahead of a man for some aspects of science. Also, women will work for less financial and social rewards.

Many of the alumnae believe a thorough training in science is more important for science teachers than training in "how-to-teach." A number of comments stressed that interest and aptitude "which come from within" are requisites for a career in science.

The Barnard faculty notes, however, that the increase in the number of independent research projects begun by students has stimulated many to continue graduate work in science.

The importance of women to science, in view of the manpower shortage in the field, is illustrated by the fact that while they make up one-third of the working force, women represent only one-twentieth of the nation's scientists.

Science News Letter, July 5, 1958

GEOPHYSICS

Europe and America Once Close to Equator

➤ EUROPE AND AMERICA were close to the equator within the last million years.

So concludes Dr. S. K. Runcorn of Cambridge University, England, from his studies on the earth's axis of rotation in long-ago times. He compared the rotation axis as found in fossil magnetic rocks with that indicated by wind direction in fossil sand dunes.

Dr. Runcorn assumed that, wherever the poles and the equator were located, there was likely to be a belt of trade winds. Size of the trade wind belt might expand or contract over a period of time.

He found a 20-degree shift of the poles would place Europe and America close to the equator. Then the wind directions shown by fossil sand dunes would be caused by trade winds. They were uniform over a large area and over a long time, thus suggesting the winds resulted, not from a local condition, but from something affecting the earth as a whole.

Dr. Runcorn's conclusions are reported in *The Observatory* (April), a publication of the Royal Astronomical Society.

Science News Letter, July 5, 1958

PSYCHOLOGY

Alcohol Affects Judgment

Even relatively small quantities of alcohol were found to affect a driver's judgment and his willingness to "take chances" while on the road.

➤ AFTER TWO WHISKIES, even some long-experienced bus drivers are willing to try to take their buses through a gap 14 inches narrower than the bus.

This was disclosed when a test was made on the effect of small and large doses of alcohol on the willingness of drivers to take chances on the road.

Results of the experiment are reported in the *British Medical Journal* (June 21) by Dr. John Cohen, E. J. Dearnaley and C. E. M. Hansel of the University of Manchester, England.

The effect of alcohol, they found, was not to make the drivers willing to take what they regarded as a bigger risk, but to make them see only the same risk in what was actually a much more difficult, or impossible, task.

The men taking part in the experiment were bus drivers for the Manchester Corporation Transport Department. They had an average of about 12 years experience driving a bus and another eight years driving other vehicles.

As each man sat in the driver's seat of his bus, two white posts three feet tall were placed 12 feet in front of the bus. The space between the posts was gradually increased two inches at a time from a gap of seven feet four inches (the bus was eight feet wide) until the driver said he thought he could drive through it safely five times out of five tries. The same procedure was repeated, increasing the gap one inch at a time to see at what width the driver would actually attempt to drive through.

One group of drivers had consumed no alcohol, another group had had two British fluid ounces, and a third group had six British fluid ounces.

No alcohol-free driver tried to drive his eight-foot bus through a gap less than seven feet, five inches in width, but three of the men who had had two ounces of alcohol were willing to attempt to drive through a gap 14 inches narrower than the bus.

The trustworthiness of a man's judgment of his driving skill is impaired, it was found, when the alcohol concentration in the blood is lower than 0.5 milligram per milliliter, the concentration set by the U. S. National Safety Council as safe.

Neither the blood alcohol of any individual driver nor his score on a reaction time test or test of skill indicates his safety on the road, it was found.

Science News Letter, July 5, 1958

PHYSICS

Electricity From Heat

A thermionic converter has been developed that has a potential efficiency of 30%. It could be used wherever a high temperature source of heat is available.

➤ A DEVICE that converts heat directly into electricity, the thermionic converter, has a potential efficiency of 30%, its inventor reported to the American Physical Society meeting at Cornell University.

Dr. Volney C. Wilson of the General Electric Research Laboratory, Schenectady, N. Y., said the latest working model of the device uses a combination of metal and ceramic disks surrounding a high vacuum. It is the size of a quarter and produces electricity when the flame of a blowtorch is played upon it.

The first thermionic converter made by Dr. Wilson in 1957 was filled with gas. Its efficiency was about eight percent.

The vacuum device has the advantage of operating at a lower temperature than the gas-filled converter, Dr. Harold F. Webster and James E. Beggs, also of the GE laboratory, have found.

The thermionic converter could be used wherever a high temperature source of heat, nuclear or conventional, is available and an electricity supply is needed, including aircraft, missiles and satellites.

It is estimated converters the size of those described should be able to operate in the one- to ten-watt range.

In the thermionic converter, two electrodes are held at high, but different, temperatures. Electrons are "boiled out" of the hotter cathode and collected by the relatively cool anode. They can then flow through an external circuit and do work.

Dr. Wilson said the gas used in the first converter was cesium vapor, which partially ionizes, thus neutralizing the space-charge effect that would otherwise block the flow of electrons from cathode to anode.

Another way of reducing the internal resistance, Dr. Wilson said, was to place the electrodes extremely close together, as is done in the vacuum converter.

Dr. John M. Houston, also of GE, reported his studies of the theoretical efficiencies that can be expected of all types of thermionic converters.

Science News Letter, July 5, 1958

CONVERTER—The new high vacuum thermionic converter (left) is compared with the gas-filled experimental model announced earlier. James E. Beggs, its inventor, holds the devices. Dr. Volney Wilson invented the gas-filled type.

RADIO

Saturday, July 12, 1958 1:30—1:45 p.m., EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.

Brig. Gen. William M. Thames, commanding general, U. S. Army Combat Surveillance Agency, Clarendon, Va., will discuss "New Eyes for Our Army."

EDUCATION

University Offers First Science Teaching Degree

➤ WHILE THE DEBATE progresses on the best way to improve science teaching, American University, Washington, D. C., has pioneered a new approach by offering a Master of Science in Science Teaching degree.

Few institutions give a comparable degree, but ten or 12 colleges and universities, including Harvard, Yale, Ohio State and others, are now working on plans for similar graduate programs.

Significantly, only six hours of the 30 required for an M.S.S.T. are to be in education. At least six hours must be in the student's major field, eight in another science, and three in the history or philosophy of science.

Science News Letter, July 5, 1958

• New Machines and Gadgets •

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 942. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

FILLING MATERIAL for upholstered furniture padding, pillows, comforters and sleeping bags is made of polyester cut fibers. The lightweight plastic filler is said to be odor-free, insect- and solvent-resistant and non-allergenic.

Science News Letter, July 5, 1958

SAFETY TRIMMER has a rotary gear-driven precision cutting wheel. The all metal trimmer has an aluminum board supported on hard-rubber foot rests. Available in four sizes, the heavy-duty trimmer will cut and trim everything from tissue paper to plastics.

Science News Letter, July 5, 1958

MEDICAL SLIDE RULE developed by a British chest physician has some 80 symptom strips, each marked with a different symptom, stored in its back. Some 340 disease categories are listed on one side of the rule's front. From one to six symptom strips can be inserted under a window for matching and reading.

Science News Letter, July 5, 1958

BEAUTY PARLOR TOY SET permits little girls to be beauticians to their dolls. The set, part of which is shown in the photograph, includes replicas of actual

beauty parlor equipment, including two automatic positioning chairs, a hair dryer, a sink, two aluminum mirrors and sundries, as well as a booklet showing various hair styles for dolls.

Science News Letter, July 5, 1958

SAFETY GOGGLES have a plastic frame which holds wide lenses that snap into the frame. Molded of polyethylene plastic, the one-piece frame extends back over the wearer's temples. Held in place by an adjustable headband, the frame also boasts a contoured nosepiece.

Science News Letter, July 5, 1958

PORTABLE LECTERN folds up into a flat 14½-by-18-inch size. Made of strong board and bound in leatherette, the lectern weighs four pounds. Unfolded, it is pitched at a 30-degree angle and has a small ledge to keep papers from falling off.

Science News Letter, July 5, 1958

TAPE CLIPS are designed to keep recording tape from spilling off a reel. Made of resilient plastic, the clips are shaped like the Greek letter omega. The clip is snapped on to one flange of the reel and if the reel is full, one leg of the clip holds the tape in place.

Science News Letter, July 5, 1958

NO-IRON SHEETS and pillow cases have a wrinkle-resistant, non-chlorine retentive finish. Made of cotton, the material dries in about half the time it takes ordinary cotton sheets. The new sheets can be washed by hand or machine, and with any type of bleach without affecting either color or fabric.

Science News Letter, July 5, 1958

Nature Ramblings

By HORACE LOFTIN

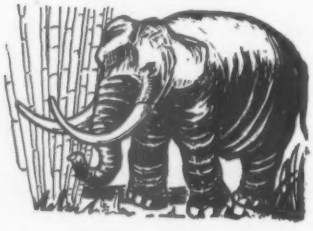
► "HOW THE elephant got his trunk" has been told by Rudyard Kipling in a delightful fantasy. The story pieced together by scientists from fragments of bones buried for thousands or millions of years differs considerably from the story-book version. It is all the more exciting because it is true.

The elephant's trunk developed from the upper lip and nose of the animal. It is well-supplied with nerves and is extremely muscular. The nostrils run the entire length of the trunk.

The degree to which the snout is elongated into a trunk is "recorded" in the bone structure of the head: the longer the snout, the greater the recession of the nasal bones and the thicker adjacent bones become for attachment of muscles. By examining these bones in finds of fossil elephants, paleontologists can estimate just how long the trunks of fossil elephants must have been.

Probably the earliest definitely distinguished form of elephant yet discovered,

A Long Story



from deposits in Africa and Asia about 60,000,000 years old, is the Palaeomastodon. This elephant was small, about the size of a modern baby elephant. It resembled somewhat the tapir of the American tropics.

From a study of bones of the head, scientists determined Palaeomastodon undoubtedly had a very short trunk and a proportionately longer head and neck. There were short tusks in the upper jaw and even shorter lower tusks.

The fossil record from some 20,000,000 to 30,000,000 years later shows a great difference.

The trend in elephant evolution was toward great size, great tusks and long, strong trunks. Apparently, the elephants spread from the center of origin in Africa and Asia across Europe and into almost every corner of North America. And as they spread, they evolved in many different manners.

One form, Dinotherium, had no tusks on the upper jaw; however, the lower tusks were long, turning downward and backward. Another, Platybelodon, varied from the common trend: the lower jaw was elongated and armed with horizontal spade-like teeth, while the "trunk" was a thick, non-tubular covering over the protruding jaw.

Elephants reached their peak in North America during the Ice Age, lasting until perhaps 10,000 years ago or less.

One inhabiting North America at that time was the imperial elephant, Archidiskodon, with tremendous curving tusks, trunk in proportion to modern elephants, that stood 13 feet tall. African elephants today rarely exceed ten feet in height.

Science News Letter, July 5, 1958